



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|----------------------------|------------------------|
| 10/670,162 | 09/23/2003 | Elena Pavlovskaja | 018563-004620US | 2838 |
| 46718 7590 11/27/2007 TOWNSEND AND TOWNSEND AND CREW, LLP (018563) TWO EMBARCADERO CENTER, EIGHTH FLOOR SAN FRANCISCO, CA 94111-3834 | | | EXAMINER SHARON, AYAL I | |
| | | | ART UNIT 2123 | PAPER NUMBER |
| | | | MAIL DATE 11/27/2007 | DELIVERY MODE PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|-------------------------------|------------------------------------|--|
| Office Action Summary | Application No. 10/670,162 | Applicant(s) PAVLOVSKAIA ET AL. | |
| | Examiner Ayal I. Sharon | Art Unit 2123 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 8/28/07.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-15,17-27 and 30-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-15,17-27 and 30-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>4/13/07</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Introduction

1. Claims 1, 3-15, 17-27 and 30-33 of U.S. Application 10/670,162, originally filed on 09/23/2003, are currently pending.
2. This application is a continuation of U.S. Application 10/241,240, now U.S. Patent 6,665,570, filed on 9/10/2002, which is a continuation of U.S. Application 09/506,419, now U.S. Patent 6,463,344, filed on 02/17/2000.
3. This action is Final.

Specification

4. The disclosure is objected to because of the following informalities: paragraph [0001] of the specifications needs to be amended to recite the patent numbers of the U.S. Patent Applications that have issued as U.S. Patents.

Appropriate correction is required.

Claim Interpretations

5. Examiner interprets the term "compress" according to the definition provided in the Microsoft Press Computer User's Dictionary, © 1998, p.76:

To reduce the size of a set of data, such as a file or a communications message, so that it can be stored in less space or transmitted with less bandwidth, while preserving high resolution.

The definition further recites:

Data can be compressed by removing repeated patterns of bits and replacing them with some form of summary that takes up less space; restoring the repeated patterns decompresses the data.

6. Examiner also notes that by applicant's own admission, "surface fitting" is a form of data compression. The applicant recited the following in the amendment filed 7/14/2006 (see p.7, paragraph 1):

Moreover, Applicant points out that the present specification is replete with disclosure regarding the data compression according to methods of the present invention (see, e.g., paragraphs [0045]-[0047], Fig.4, Fig.5, etc.)

...

Paragraph [0045] of the specification includes the following teachings:

A network of curves and its relationship to the original data points can then be generated ...A patch representation is generated from the network to arrive at a full surface description. More details on the surface fitting are discussed in pages 101-110 of Alan Watt and Mark Watt, Advanced Animation and Rendering Techniques (Addison-Wesley Publishing Company, Menlo Park, California).

The Watt et al. reference is reference "CB" in the IDS filed on 1/10/2007.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
9. The prior art used for these rejections is as follows:
- a. U.S. Patent 5,975,893 to Chishti et al. ("**Chishti**").
 - b. Watt et al., Advanced Animation and Rendering Techniques, © 1992, pp. 101-110. ("**Watt**").
 - c. Yamani, S.M. et al. "A System for Human Jaw Modeling Using Intra-Oral Images". Proc. of the 20th Annual Conf. of the IEE Eng'g in Medicine and Biology Society. Nov.1, 1998. Vol.2, pp.563-566. ("**Yamani**").
10. The claim rejections are hereby summarized for Applicant's convenience. The detailed rejections follow.
- 11. Claims 1, 3, 9-15, 17-23, and 30-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chishti in view of Watt.**
12. In regards to Claim 1, Chishti teaches the following limitations:
- 1. *(currently amended) A computer-implemented method for generating a computer model of one or more teeth, comprising:*

receiving as input a digital data set of meshes representing the teeth;

(See Chishti, especially: col.9, line 43 to col.10, line 7)

creating inside and outside meshes by determining an intersection between a tooth mesh and a cutter mesh;

(See Chishti, especially: col.11, line 58 – col.12, line 8; and Fig.4 and Fig.4A)

... the parametric representation comprising exposed tooth surface image data and unexposed tooth portion image data, ...

(See Chishti, especially: col.14, lines 10-16)

... displaying the parametric representation of the teeth ...

(See Chishti, especially: col.11, line 58 – col.12, line 8; and Fig.4 and Fig.4A)

However, while Chishti teaches representing “parallel set of digital data set ... at a lower resolution” (See Chishti at col.10, lines 52-56.), Chisti does not expressly teach the following limitation:

creating a parametric representation of the teeth from the meshes representing the teeth and the inside and outside meshes, ... and further providing compression of the digital data set;

.... displaying the parametric representation of the teeth providing the compressed digital data set so as to provide a high-resolution image of the teeth.

Watt, on the other hand, teaches the use of “parametric surface fitting” to compress data by representing the data as a set of parameter-defined curves.
(see Watt, pp.101-110, especially intro to section 3.7 “Surface fitting”, and section 3.7.1 “A B-spline surface fitter”).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the teachings of Chishti with those of Watt to compress the image data.

The motivation for combining the references would have been to reduce the size of a set of data, such as a file or a communications message, so that it can be stored in less space or transmitted with less bandwidth, while preserving high resolution. (See the definition of "compress" in the Microsoft Press Computer User's Dictionary).

Moreover, by Applicant's own admission in paragraph [0045] of the specification, and in p.7 of the amendment filed 7/14/2006, Watt's method of data compression was old and well known in the art.

Therefore, it would have been obvious to a person of ordinary skill in the art to modify Chishti with Watt to obtain the invention as specified in Claim 1.

13. In regards to Claim 3, Chishti teaches the following limitations:

3. *(previously presented) The method of claim 1, further comprising storing the compressed data in a file.*

(Chishti, especially: col.10, lines 52-56.)

Examiner interprets that the "digital data set" corresponds to a file.

14. In regards to Claim 9, Watt teaches the following limitations:

9. *(previously presented) The method of claim 2, wherein creating a parametric representation further comprises generating a curve network.*

(See Watt, especially: section 3.7.1 "A B-spline surface fitter")

15. In regards to Claim 10, Watt teaches the following limitations:

10. *(previously presented) The method of claim 9, further comprising fitting the curve network to the digital data set.*

(See Watt, especially: section 3.7.1 "A B-spline surface fitter")

16. In regards to Claim 11, Chishti teaches the following limitations:

11. *(previously presented) The method of claim 1, wherein receiving the digital data set comprises receiving data obtained by scanning a physical model of the teeth.*

(See Chishti, especially: Fig.2; and col.9, line 14 to col.10, line 7)

17. In regards to Claim 12, Chishti teaches the following limitations:

12. *(previously presented) The method of claim 1, further comprising scanning a physical model of the teeth with a destructive scanning system.*

(See Chishti, especially: Fig.2; and col.9, line 14 to col.10, line 7)

Examiner interprets that Chishti's "contact-type scanner" corresponds to the claimed "destructive scanning system."

18. In regards to Claim 13, Chishti teaches the following limitations:

13. *(previously presented) The method of claim 12, further comprising scanning the physical model with a laser scanning system before scanning the model with the destructive scanning system.*

(See Chishti, especially: Fig.2; and col.9, line 14 to col.10, line 7)

Examiner interprets that Chishti's "contact-type scanner" corresponds to the claimed "destructive scanning system", and a "non-contact scanner" corresponds to a laser scanner.

19. In regards to Claim 14, Chishti teaches the following limitations:

14. *(previously presented) The method of claim 13, further comprising scanning physical models of a patient's upper and lower teeth in occlusion with the laser scanning system before scanning with the destructive scanning system.*

(See Chishti, especially: Fig.2; and col.9, line 14 to col.10, line 7)

Examiner interprets that Chishti's "contact-type scanner" corresponds to the claimed "destructive scanning system", and a "non-contact scanner" corresponds to a laser scanner.

20. In regards to Claim 15, Chishti teaches the following limitations:

15. (previously presented) The method of claim 1, wherein the digital data set includes volume image data of the teeth and the method includes converting the volume image data into a 3D geometric model of the tooth surfaces.

(See Chishti, especially: Fig.2; and col.9, line 14 to col.10, line 7)

21. In regards to Claim 17, Chishti teaches the following limitations:

17. (currently amended) The method of claim 17, further comprising joining the inside and outside meshes to create a closed surface for each of the individual teeth.

(See Chishti, especially: Fig.2; and col.9, line 14 to col.10, line 7)

22. In regards to Claim 18, Chishti teaches the following limitations:

18. (previously presented) The method of claim 1, further comprising rendering a three-dimensional (3D) graphical representation of the individual teeth.

(See Chishti, especially: Fig.2; and col.9, line 14 to col.10, line 7)

23. In regards to Claim 19, Chishti teaches the following limitations:

19. (previously presented) The method of claim 18, further comprising receiving an instruction from a human user to modify the graphical representation of the teeth and modifying the graphical representation in response to the instruction.

(See Chishti, especially: col.10, lines 29-48; and col.11, line 58 – col.12, line 8; and Fig.4 and Fig.4A)

Examiner interprets that Chishti's "two cubic B-spline curves" correspond to a curve network.

24. In regards to Claim 20, Chishti teaches the following limitations:

20. (previously presented) The method of claim 18, further comprising modifying the selected data set in response to the instruction from the user.

(See Chishti, especially: col.10, lines 29-48; and col.11, line 58 – col.12, line 8; and Fig.4 and Fig.4A)

Examiner interprets that Chishti's "two cubic B-spline curves" correspond to a curve network.

25. In regards to Claim 21, Chishti teaches the following limitations:

21. *(previously presented) The method of claim 1, further comprising delivering data representing positions of the teeth at selected points along treatment paths to an appliance fabrication system for use in fabricating at least one orthodontic appliance structured to move the teeth toward a final position for the teeth.*

(See Chishti, especially: col.7, line 65 to col.9, line 14; and Figs.1A, 1B, and 1C)

26. In regards to Claim 22, Chishti teaches the following limitations:

22. *(currently amended) The method of claim 1, further comprising storing the compressed data set as a 3D geometric model representing visible surfaces of the corresponding tooth.*

(Chishti, especially: col.10, lines 52-56.)

Examiner interprets that the "parallel set of digital data set ... at a lower resolution" corresponds to the claimed "compressed digital representation."

27. In regards to Claim 23, Chishti teaches the following limitations:

23. *(previously presented) The method of claim 22, further comprising modifying each 3D model to include hidden surfaces of the corresponding tooth.*

(Chishti, especially: col.10, line 48 to col.11, line 38.)

28. In regards to Claim 30, Chishti teaches the following limitations:

30. *(New) A computer-implemented method for generating model of a patient's teeth from a first 3D model of the patient's teeth for efficient transmission of patient information, the method comprising:*

receiving as input a digital data set of meshes representing the teeth;

(See Chishti, especially: col.9, line 43 to col.10, line 7)

... storing the compressed data in a file for transmission of the compressed data to a remote computer and ...

(Chishti, especially: col.10, lines 52-56. Examiner interprets that the "digital data set" corresponds to a file.)

... the parametric representation comprising exposed tooth surface image data and unexposed tooth portion image data, ...

(See Chishti, especially: col.14, lines 10-16)

However, Chisti does not expressly teach the following limitation:

creating from the digital data set of meshes a parametric representation of the digital data set comprising a curve network fitted to the digital data set, ... and further providing a compressed version of the digital data set; and

... displaying of a high-resolution image of the patient's teeth, the high-resolution image comprising tooth interproximal area information or a tooth root shape information.

Watt, on the other hand, teaches the use of "parametric surface fitting" to compress data by representing the data as a set of parameter-defined curves.

(see Watt, pp.101-110, especially section 3.7.1 "A B-spline surface fitter").

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the teachings of Chishti with those of Watt to compress the image data.

The motivation for combining the references would have been to reduce the size of a set of data, such as a file or a communications message, so that it can be stored in less space or transmitted with less bandwidth, while preserving high resolution. (See the definition of "compress" in the Microsoft Press Computer User's Dictionary).

Moreover, by Applicant's own admission in paragraph [0045] of the specification, and in p.7 of the amendment filed 7/14/2006, Watt's method of data compression was old and well known in the art.

Therefore, it would have been obvious to a person of ordinary skill in the art to modify Chishti with Watt to obtain the invention as specified in Claim 30.

29. In regards to Claim 31, Chishti does not expressly teach the following limitations:

31. (New) The method of claim 30, wherein the fitting comprises obtaining a location of a sample point, obtaining a normal or a tangent for the sample point, generating a (u, v) representation for the sample point, and building the curve network from the (u, v) representation.

Watt, on the other hand, teaches the use of "parametric surface fitting" to compress data by representing the data as a set of parameter-defined curves. (see Watt, pp.101-110, especially section 3.7.1 "A B-spline surface fitter").

It would have been obvious to a person of ordinary skill in the art to modify Chishti with Watt to obtain the invention as specified in Claim 31 for the same reasons as specified in claim 30.

30. In regards to Claim 32, Chishti does not expressly teach the following limitations:

32. (New) The method of claim 30, wherein the fitting comprises selecting a set of sample points from the digital data set, generating tangent values for the sample points to define a curve, and determining the length of the curve.

Watt, on the other hand, teaches the use of "parametric surface fitting" to compress data by representing the data as a set of parameter-defined curves. (see Watt, pp.101-110, especially section 3.7.1 "A B-spline surface fitter").

It would have been obvious to a person of ordinary skill in the art to modify Chishti with Watt to obtain the invention as specified in Claim 32 for the same reasons as specified in claim 30.

31. In regards to Claim 33, Chishti does not expressly teach the following limitations:

33. (New) The method of claim 1, wherein the unexposed portion of the tooth comprises an interproximal surface area of a tooth or a tooth root.

Watt, on the other hand, teaches the use of "parametric surface fitting" to compress data by representing the data as a set of parameter-defined curves. (see Watt, pp.101-110, especially section 3.7.1 "A B-spline surface fitter").

It would have been obvious to a person of ordinary skill in the art to modify Chishti with Watt to obtain the invention as specified in Claim 33 for the same reasons as specified in claim 30.

32. Claims 4-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chishti in view of Watt and further in view of Official Notice.

33. In regards to Claim 4, Chishti teaches the following limitations:

4. (previously presented) The method of claim 1, further comprising transmitting the compressed data to a remote computer.

Official Notice is taken that transmitting compressed data to a remote computer was old and well known at the time the invention was made in the analogous art of U.S. Patent 6,227,850 to Chisti (See Fig.20), and U.S. Patent 6,044,170 to Migdal et al. (see col.4, lines 10-30).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to transmit compressed data to a remote computer, in

order to enable work to be performed in remote locations, to facilitate the sharing of information between different computers and employees, etc.

The motivation for combining the references would have been to enable the data to be stored, viewed, or modified, on a different computer, and to do so with compressed data in order to minimize the use of bandwidth on the communications medium.

Therefore, it would have been obvious to a person of ordinary skill in the art to modify Chishti and Watt to obtain the invention as specified in Claim 4.

34. In regards to Claim 5, Chishti teaches the following limitations:

5. *(previously presented) The method of claim 4, further comprising displaying the compressed data on the remote computer.*

Official Notice is taken that displaying compressed data on the remote computer was old and well known at the time the invention was made in the analogous art of U.S. Patent 6,227,850 to Chisti (See Fig.20), and U.S. Patent 6,044,170 to Migdal et al. (see col.4, lines 10-30).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to display compressed data to a remote computer, in order to enable work to be performed in remote locations, to facilitate the sharing of information between different computers and employees, etc.

The motivation for combining the references would have been to enable the data to be stored, viewed, or modified, on a different computer, and to do so with compressed data in order to minimize the use of bandwidth on the communications medium.

Therefore, it would have been obvious to a person of ordinary skill in the art to modify Chishti and Watt to obtain the invention as specified in Claim 5.

35. In regards to Claim 6, Chishti does not expressly teach the following limitation:

6. *(previously presented) The method of claim 4, wherein the compressed data are transmitted over a network.*

Official Notice is taken that transmit compressed data over a network was old and well known at the time the invention was made in the analogous art of U.S. Patent 6,227,850 to Chisti (See Fig.20), and U.S. Patent 6,044,170 to Migdal et al. (see col.4, lines 10-30).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to transmit compressed data over a network, in order to enable work to be performed in remote locations, to facilitate the sharing of information between different computers and employees, etc.

The motivation for combining the references would have been to enable the data to be stored, viewed, or modified, on a different computer, and to do so with compressed data in order to minimize the use of bandwidth on the communications medium.

Therefore, it would have been obvious to a person of ordinary skill in the art to modify Chishti and Watt to obtain the invention as specified in Claim 6.

36. In regards to Claim 7, Chishti teaches the following limitations:

7. *(previously presented) The method of claim 6, wherein the network is a wide area network.*

Official Notice is taken that transmitting compressed data over a wide area network was old and well known at the time the invention was made in the analogous art of U.S. Patent 6,227,850 to Chisti (See Fig.20), and U.S. Patent 6,044,170 to Migdal et al. (see col.4, lines 10-30).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to transmit compressed data over a wide area network, in order to enable work to be performed in remote locations, to facilitate the sharing of information between different computers and employees, etc.

The motivation for combining the references would have been to enable the data to be stored, viewed, or modified, on a different computer, and to do so with compressed data in order to minimize the use of bandwidth on the communications medium.

Therefore, it would have been obvious to a person of ordinary skill in the art to modify Chishti and Watt to obtain the invention as specified in Claim 7.

37. In regards to Claim 8, Chishti teaches the following limitations:

8. *(previously presented) The method of claim 6, wherein the network is the Internet.*

Official Notice is taken that transmitting compressed data over the internet was old and well known at the time the invention was made in the analogous art of U.S. Patent 6,227,850 to Chisti (See Fig.20), and U.S. Patent 6,044,170 to Migdal et al. (see col.4, lines 10-30).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to transmit compressed data over the internet, in order to

enable work to be performed in remote locations, to facilitate the sharing of information between different computers and employees, etc.

The motivation for combining the references would have been to enable the data to be stored, viewed, or modified, on a different computer, and to do so with compressed data in order to minimize the use of bandwidth on the communications medium.

Therefore, it would have been obvious to a person of ordinary skill in the art to modify Chishti and Watt to obtain the invention as specified in Claim 8.

38. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chishti in view of Watt, and further in view of Yamani.

39. In regards to Claim 24, Chishti teaches the following limitations:

24. *(currently amended) A computer-implemented method for generating a computer model of one or more teeth, comprising:*

receiving as input a digital data set of meshes representing the teeth;

(See Chishti, especially: col.9, line 43 to col.10, line 7)

Examiner interprets that the "parallel set of digital data set ... at a lower resolution" corresponds to the claimed "compressed digital representation."

... the parametric representation comprising exposed tooth surface image data and unexposed tooth portion image data, ...

(See Chishti, especially: col.14, lines 10-16)

displaying the computer model of the teeth using a parametric representation;

(See Chishti, especially: col.11, line 58 – col.12, line 8; and Fig.4 and Fig.4A)

rendering a three-dimensional (3D) graphical representation of the individual teeth; and

(See Chishti, especially: col.11, line 58 – col.12, line 8; and Fig.4 and Fig.4A)

allowing a human user to select a tooth in the graphical representation and, in response, displaying information about the tooth,

(See Chishti, especially: col.6, lines 38-49)

... the information comprising an interproximal area or a tooth root shape information.

(See Chishti, especially: col.14, lines 10-16)

However, while Chishti teaches representing “parallel set of digital data set ... at a lower resolution” (See Chishti at col.10, lines 52-56.), Chisti does not expressly teach the following limitation:

creating a parametric representation of the teeth from the meshes representing the teeth and the inside and outside meshes, ... and further providing compression of the digital data set;

Watt, on the other hand, teaches the use of “parametric surface fitting” to compress data by representing the data as a set of parameter-defined curves. (see Watt, pp.101-110, especially section 3.7.1 “A B-spline surface fitter”).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the teachings of Chishti with those of Watt to compress the image data.

The motivation for combining the references would have been to reduce the size of a set of data, such as a file or a communications message, so that it can be stored in less space or transmitted with less bandwidth, while preserving high resolution. (See the definition of “compress” in the Microsoft Press Computer User’s Dictionary).

Moreover, by Applicant's own admission in paragraph [0045] of the specification, and in p.7 of the amendment filed 7/14/2006, Watt's method of data compression was old and well known in the art.

Therefore, it would have been obvious to a person of ordinary skill in the art to modify Chishti with Watt to obtain the invention as specified in Claim 1.

Chishti also does not expressly teach the following limitation:

... receiving an input signal from a 3D gyroscopic input device controlled by a human user and using the input signal to alter an orientation of the teeth in the graphical representation ...

Yamani, on the other hand, does expressly teach this limitation (see Yamani, Fig.4).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the teachings of Chishti with those of Yamani, to view the anatomical object (in this case, teeth) from different angles.

The suggestion for doing so is Yamani's teaching that "such a model will be a tremendous asset in dental training and teaching." (Yamani, p.564, first paragraph).

Therefore, it would have been obvious to combine Chishti with Yamani to obtain the invention as specified in claim 24.

40. In regards to Claim 25,

25. *(previously presented) The method of claim 24 wherein rendering the graphical representation comprises rendering the teeth at a selected one of multiple viewing orthodontic-specific viewing angles.*

Claim 25 is rejected on the same grounds as claim 24.

41. In regards to Claim 26,

26. (previously presented) The method of claim 24, further comprising providing a user interface through which a human user can provide text-based comments after viewing the graphical representation of the teeth.

Claim 26 is rejected on the same grounds as claim 24.

42. Claim 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Chishti in view of Watt, and further in view of Yamani, and further in view of Official Notice.

43. In regards to Claim 27, Chishti does not expressly teaches the following limitations:

27. (previously presented) The method of claim 24, wherein rendering the graphical representation comprises downloading data to a remote computer at which a human user wishes to view the graphical representation.

Official Notice is taken that downloading data at a remote computer was old and well known at the time the invention was made in the analogous art of U.S. Patent 6,227,850 to Chisti (See Fig.20), and U.S. Patent 6,044,170 to Migdal et al. (see col.4, lines 10-30).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to download data at a remote computer, in order to enable work to be performed in remote locations, to facilitate the sharing of information between different computers and employees, etc.

The motivation for combining the references would have been to enable the data to be stored, viewed, or modified, on a different computer, and to do so

with compressed data in order to minimize the use of bandwidth on the communications medium.

Therefore, it would have been obvious to a person of ordinary skill in the art to modify Chishti, Watt and Yamani to obtain the invention as specified in Claim 27.

Response to Amendment

Response to Arguments

44. The Applicants unpersuasively argue (See p.9, para. 2 of Applicants' remarks filed 8/28/07) that:

Watt merely provides generic teachings regarding surface fitting/rendering techniques, in general, but Watt is silent about application of these generically described techniques in dental/orthodontics or in creating a representation of a patient's teeth.

45. In response to applicant's argument, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. The Examiner finds that Chishti in view of Watt are capable of performing the intended use.

46. Moreover, by Applicant's own admission in paragraph [0045] of the specification, and in p.7 of the amendment filed 7/14/2006, Watt's method of data compression was old and well known in the art.

47. In addition, the Examiner provided the motivation for combining the references in the original rejection: to reduce the size of a set of data, such as a file or a communications message, so that it can be stored in less space or transmitted with less bandwidth, while preserving high resolution. (See the definition of "compress" in the Microsoft Press Computer User's Dictionary).

48. The Applicants also unpersuasively argue (See p.9, para. 2 of Applicants' remarks filed 8/28/07) that:

Producing the claimed invention is not merely an exercise of simple mechanics in combining the two cited references, but even if combined would actually require additional teachings and/or reconstruction or re-engineering not taught by either reference alone or in combination. Indeed, the cited Watt reference laments the difficulties in fitting parametric surfaces, in general (see, e.g., opening paragraph of the reference including stating inter alia that "Fitting a parametric surface through an arbitrary set of data points is a difficult problem.")

49. Examiner notes that while the Watt reference states that "[f]itting a parametric surface through an arbitrary set of data points is a difficult problem", Watt then proceeds to solve this problem using (1) a B-spline surface fitter, twist vectors, NURBS, β -Splines, etc.

50. By definition, a "parametric surface" is one that can be defined with subset of data points, eliminating the need to store all data points. This is an inherent attribute of parametric surfaces. As Watt teaches in the opening paragraph on

p.101, "parametric surface fitting requires us to construct an entire analytical description from a mere collection of points."

51. Therefore, the "difficulty" of the "difficult problem" relates to using a sparse data set to create parametric equations that define the surface. The difficulty has no relation to any particular intended use.

52. The Applicants also unpersuasively argue (See p.9, para. 2 of Applicants' remarks filed 8/28/07) that:

Watt lacks the specific teachings as described in the current specification, e.g., at paragraphs 0045-0062 of the published application, for practicing the claimed method as recited in claim 1.

53. The Examiner respectfully disagrees. Watt teaches the use of U-curves and V-curves in section 3.7.1. These U-curves and V-curves correspond the same U-curves and V-curves described in paragraph [0045] of the specification.

Moreover, in regards to the matrix computations described by the Applicants in paragraphs [0046]-[0054], Watt teaches the use of matrix computations in sections 3.10 and 3.11.

54. Perhaps most importantly, Examiner notes in response to applicant's argument that the references fail to show certain features of applicant's invention, that the features upon which applicant relies (i.e., the specific teachings at paragraphs 0045-0062 of the published application) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

55. The Applicants also unpersuasively argue (See p.10, para. 2 of Applicants' remarks filed 8/28/07) that:

However, a review of the reference to Watt was unable to locate any discussion of data compression techniques per se or use of the surface fitting techniques specifically to reduce file size. Similarly, the cited dictionary definition of data compression makes no reference to Watt or parametric surface fitting.

56. By definition, a "parametric surface" is one that can be defined with subset of data points, eliminating the need to store all data points. This is an inherent attribute of parametric surfaces. As Watt teaches in the opening paragraph on p.101, "parametric surface fitting requires us to construct an entire analytical description from a mere collection of points." Therefore, it is inherent that a parametric surface is a compression technique for storing data, because the only data that needs to be stored are the parameters for the surface functions (rather than an entire set of sampled data).

57. The Applicants also unpersuasively argue (See p.10, para. 2 of Applicants' remarks filed 8/28/07) that:

Furthermore, Chishti already teaches a method of reducing the size of a set of data (i.e., creating lower resolution images), so what would be the motivation for introducing another means of data reduction where Chishti already provides a solution?

The motivation for combining the references would have been to reduce the size of a set of data, such as a file or a communications message, so that it can be stored in less space or transmitted with less bandwidth, while preserving high

resolution. Chishti's solution of lower resolution images does not preserve the resolution.

58. The Applicants also unpersuasively argue (See p.10, para. 2 of Applicants' remarks filed 8/28/07) that:

Moreover, Chishti makes no reference or mention of the Watt reference, which pre-dates Chishti by some 5 years, further weighing against the alleged obviousness and motivation to make the proposed combination.

59. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

60. In this case, the motivation to combine the references would be found in the knowledge generally available to one of ordinary skill in the art about the inherent characteristics of parametric surfaces. Examiner notes that that the Böhm et al. reference cited by the Applicants in the IDS filed on 1/10/07 ("A Survey of Curve and Surface Methods in CAGD", see p.15) teaches that B-spline curves have been well known since the early 1970's.

Conclusion

61. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (571) 272-3714. The examiner can normally be reached on Monday through Thursday, and the first Friday of a bi-week, 8:30 am – 5:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753.

Application/Control Number:
10/670,162
Art Unit: 2123

Page 26

Any response to this office action should be faxed to (571) 273-8300, or mailed
to:

USPTO
P.O. Box 1450
Alexandria, VA 22313-1450

or hand carried to:

USPTO
Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Any inquiry of a general nature or relating to the status of this application or
proceeding should be directed to the Tech Center 2100 Receptionist, whose
telephone number is (571) 272-2100.

Ayal I. Sharon
Art Unit 2123
November 19, 2007



PAUL RODRIGUEZ
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100